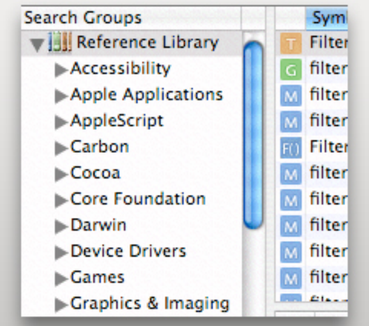
Development Tools State of the Union

Session 400

These are confidential sessions—please refrain from filming or taking pictures.



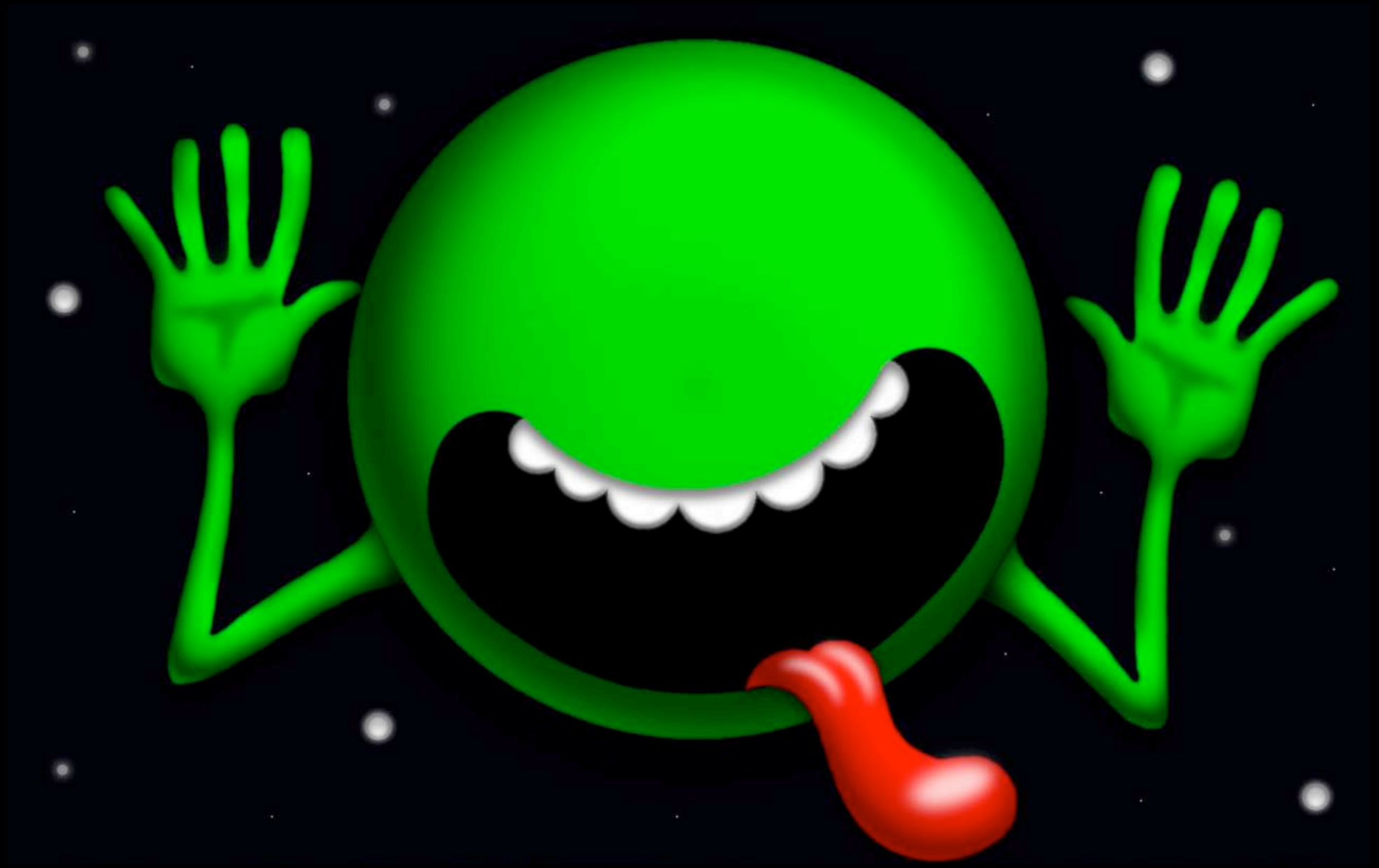
Development Tools

Development Tools State of the Union

Ted Goldstein
Vice President, Development Technologies

http://developer.apple.com/wwdc2005/

THE HITCHHIKER'S Guide to Xcode Tools



DON’T PANIC

Apple has the tools you need to create the Greatest Applications in the Universe

Recap

Tiger

Automator

Why Is Automator Great for Your App?

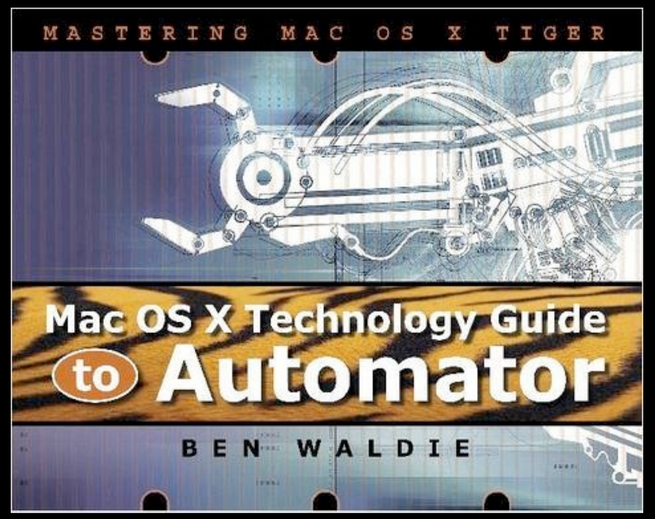
Synergy between applications

- Natural evolution of AppleScript and Script Editor
- Bring your application's object model to the power user
- Automation is easy for users
- Increases adoption
- Locks your app into workflows
- It's easy to create actions

Automator Rocks

Tremendous Adoption

- Over 500 Third Party Actions
- Books!
- Incredible Web Community
  - http://www.automatorworld.com/
  - http://automatoractions.com/ (http://www.macscripter.net/)
  - http://versiontracker.com (search for Automator)
  - http://www.automatedworkflows.com/automator/actions.html
  - http://www.completedigitalphotography.com/



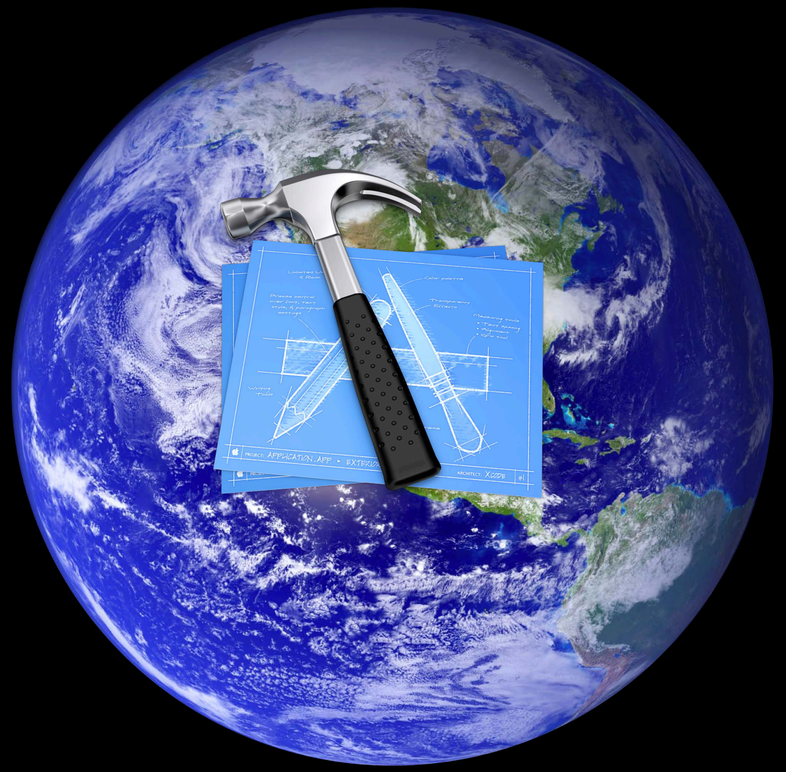
Xcode 2.0

Color palette
Transparency Effects
Measuring tools
• Text spacing
• Alignment
• Grid tool
Writing Tools
PROJECT: APPLICATION.APP
ARCHITECT: XCODE

Fastest way to create applications for Mac OS X

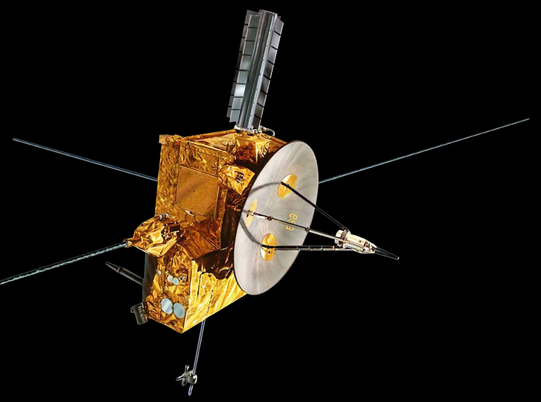
- CodeSense
- Predictive Compilation
- Distributed Builds
- ZeroLink
- Fix and Continue

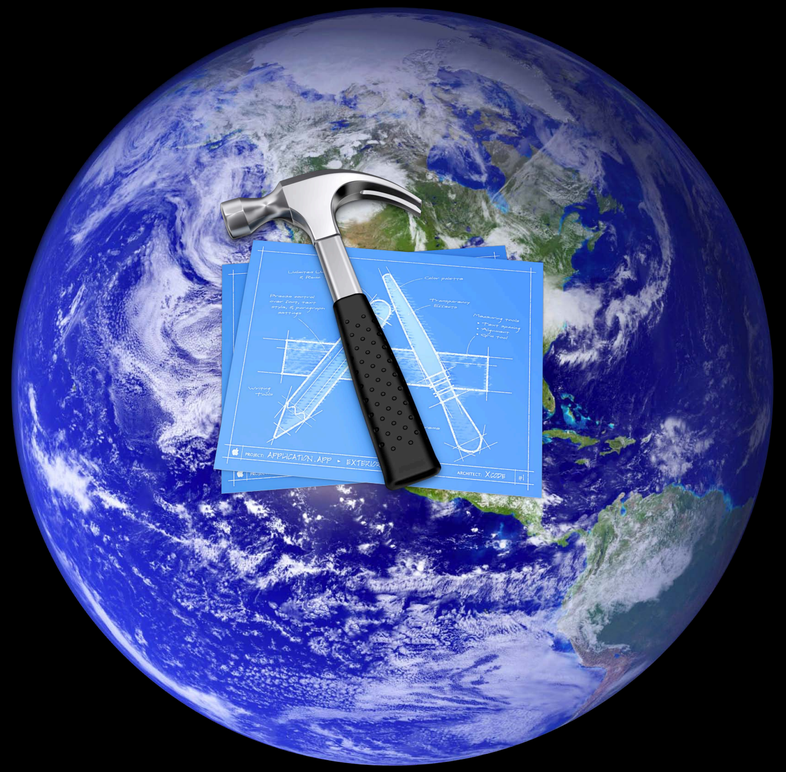
Xcode 2.0



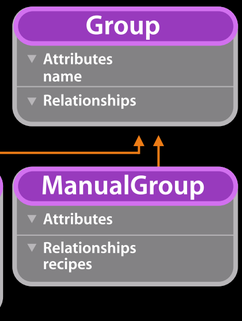
GCC

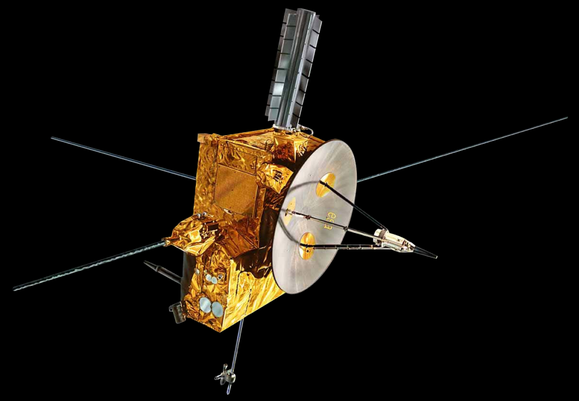
Networking
The Definitive Guide
Inside Mac OS X
Performance



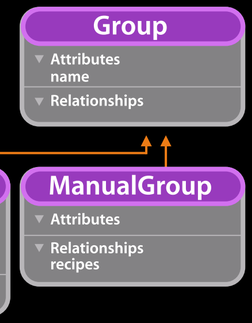


WebObjects 5


Group
Attributes
name
Relationships
SmartGroup
Attributes
predicateData
priority
Relationships
ManualGroup
Attributes
Relationships
recipes



gcc 3.3 → 4.0



Xcode 2.0

GCC 4.0 Improvements in Xcode 2.0

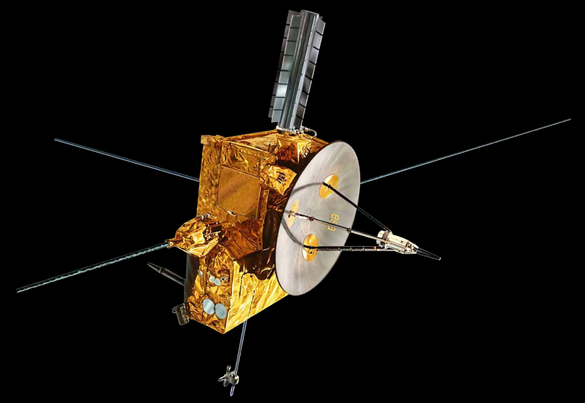
	Faster	Better	More Powerful
Front-End	20-30% faster compiles	New C++ and Objective-C++	Improved Errors and Warnings
Middle-End	Autovectorization	Improved Integration	Tree-SSA
Back-End	Long doubles	C++ ABI libstdc++.dylib	64-bit

Autovectorization

-ftree-vectorize

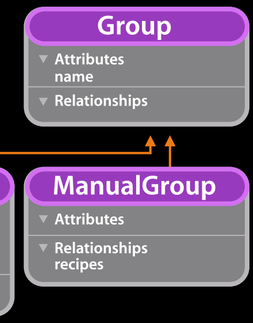
```
for (i=0; i < 1024;i++)
 {
      tri[0][i] = ri[0][i] + ri[2][i];
      tri[1][i] = ri[1][i] + ri[3][i];
      tri[2][i] = ri[0][i] - ri[2][i];
      tri[3][i] = ri[1][i] - ri[3][i];

      ri[0][i] = tri[0][i] + tri[1][i];
      ri[1][i] = tri[0][i] - tri[1][i];
      ri[2][i] = tri[2][i] - tri[3][i];
      ri[3][i] = tri[2][i] + tri[3][i];
}
```

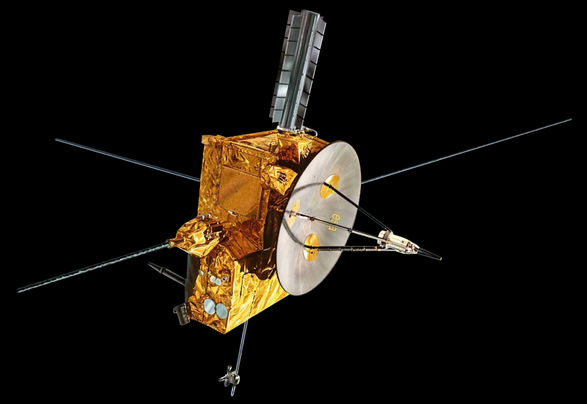
10-20% performance improvement



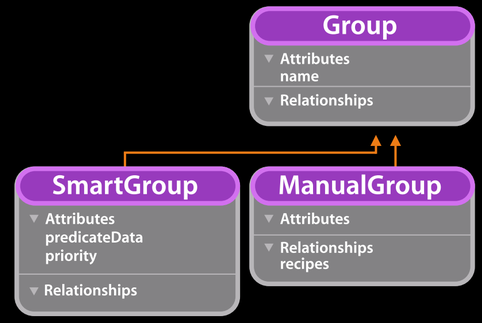
Java 1.4 → 5.0

Xcode 2.0

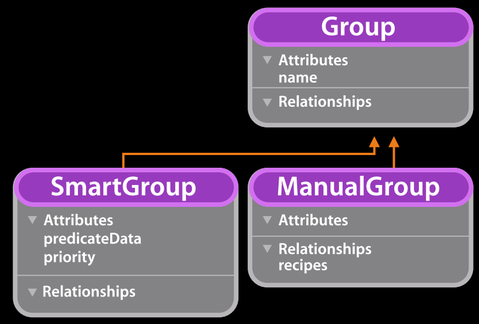




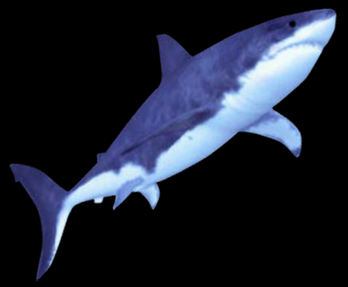
Shark 3.8 → 4.1

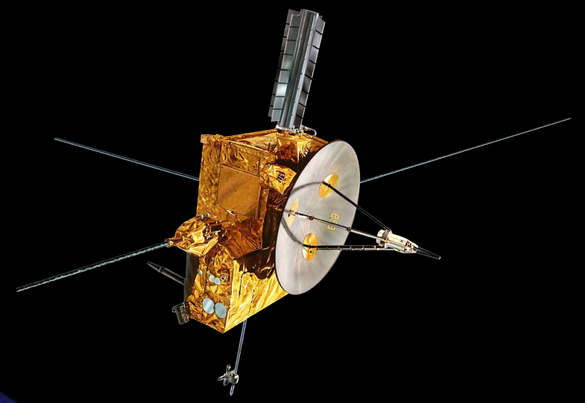


Xcode 2.0

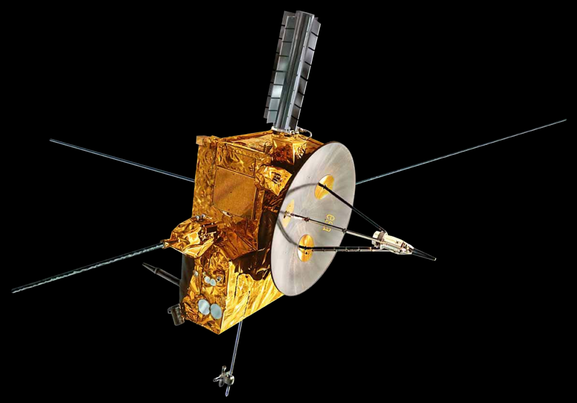


WebObjects 5.2.3 → 5.2.4





Xcode 2.0



Xcode Design Tools

Group

- Attributes
  name
- Relationships

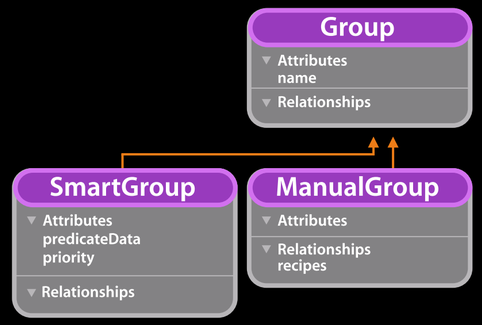
SmartGroup

- Attributes
  predicateData
  priority
- Relationships

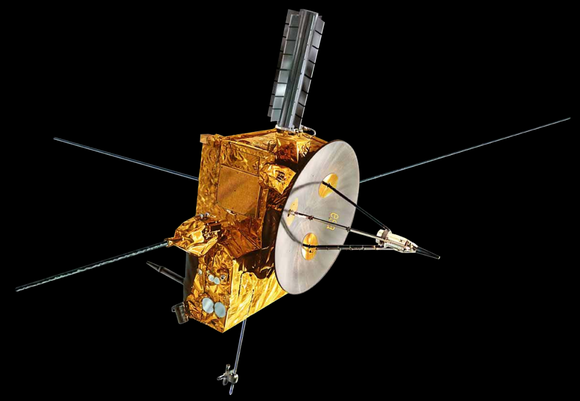
ManualGroup

- Attributes
- Relationships
  recipes

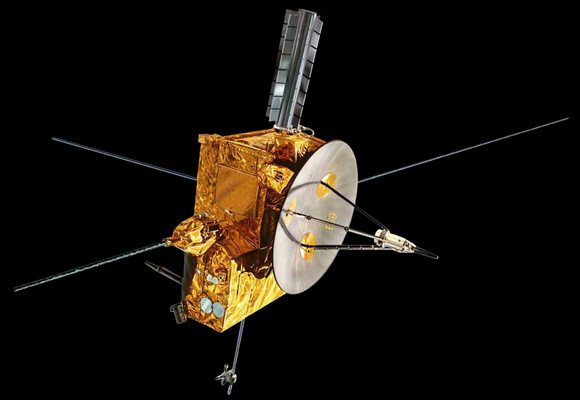
Xcode 2.0



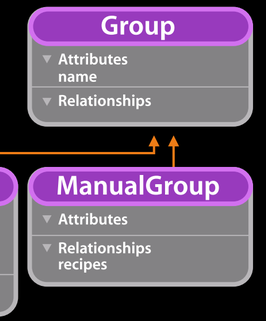
Quartz Composer



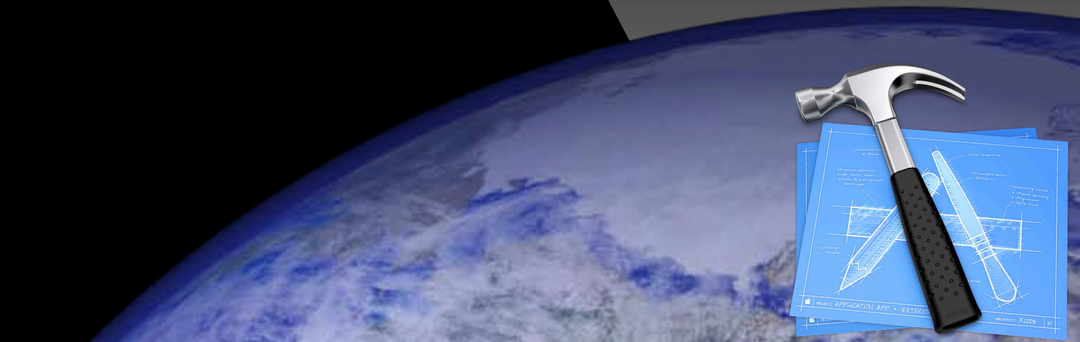
Xcode 2.0



ADC Reference Library



Xcode 2.0



Let’s Broaden Our Horizons

Welcome to the Universe

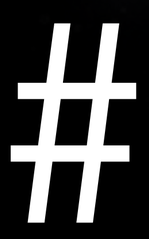
Xcode 2.1 The Universal IDE

PowerPC

intel

Universal

GCC



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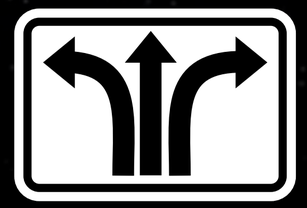
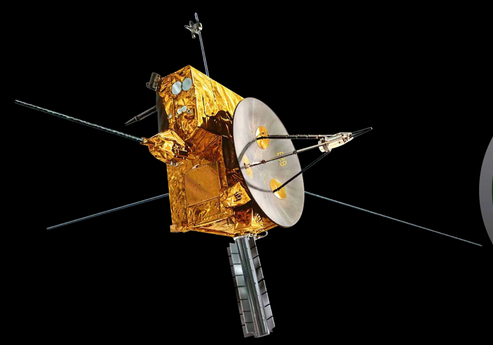
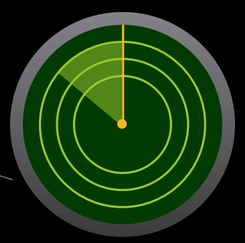


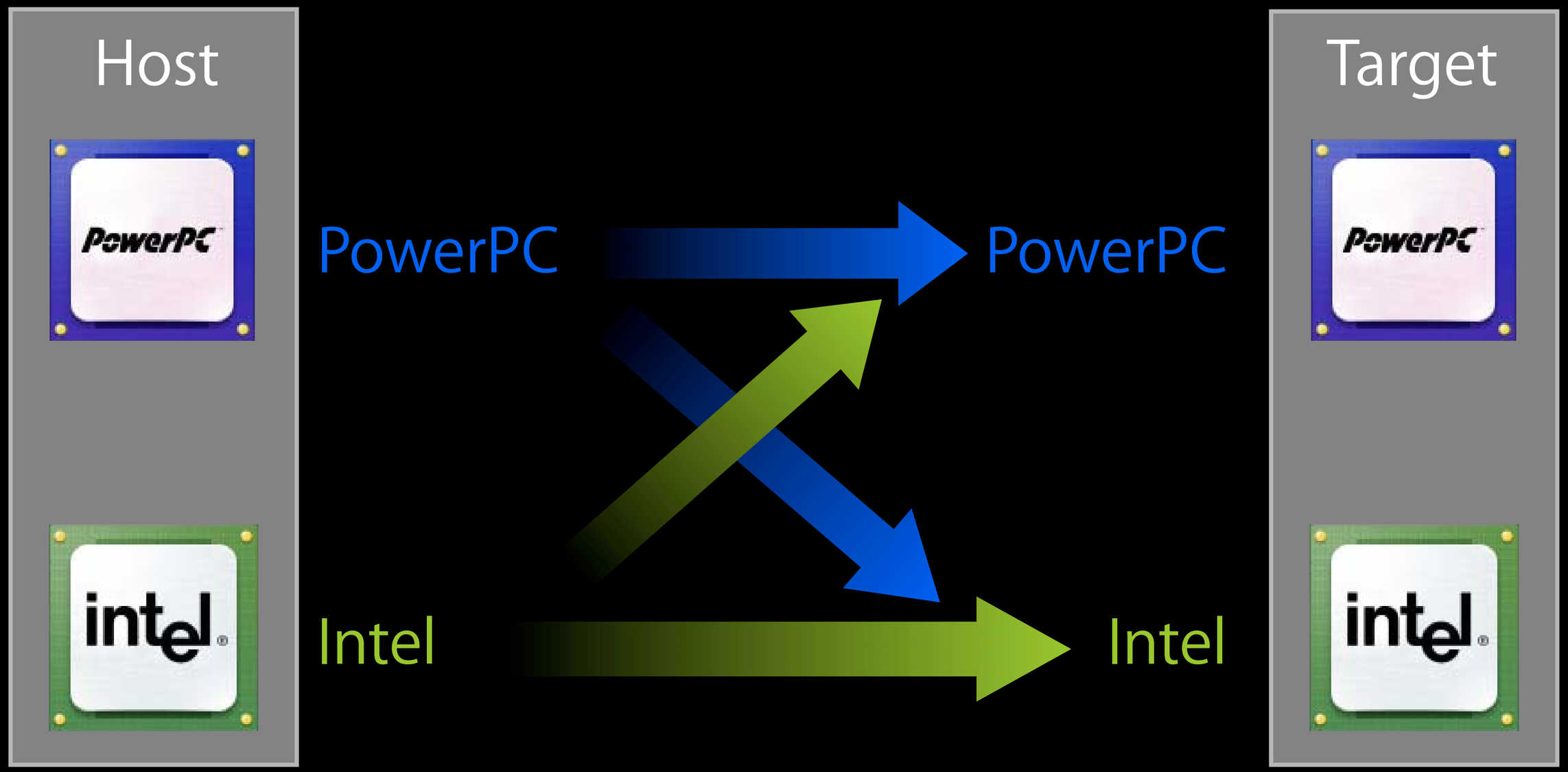




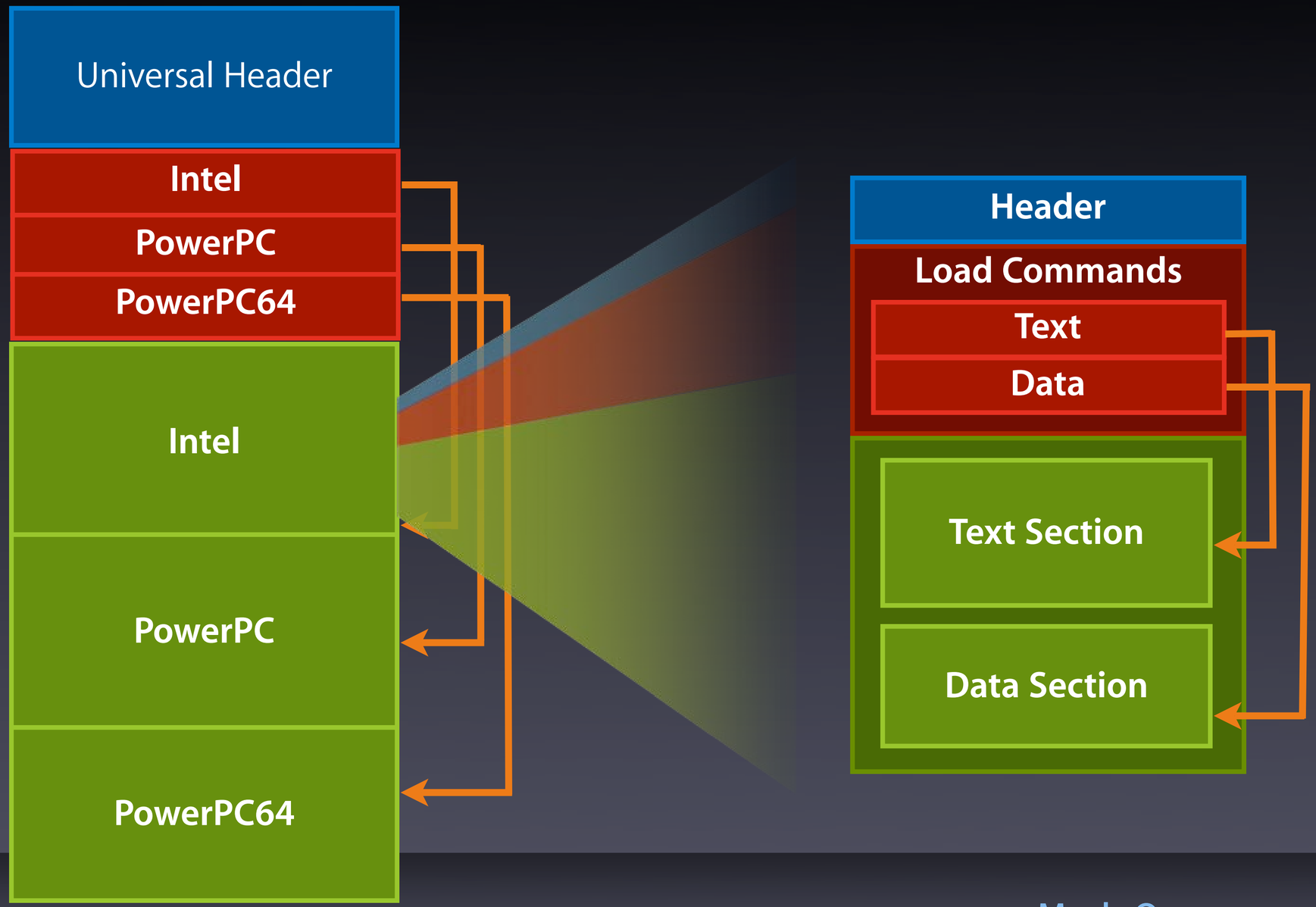
Universal

PDF
Universal
NIB
TIFF
PowerPC
intel

Universal IDE

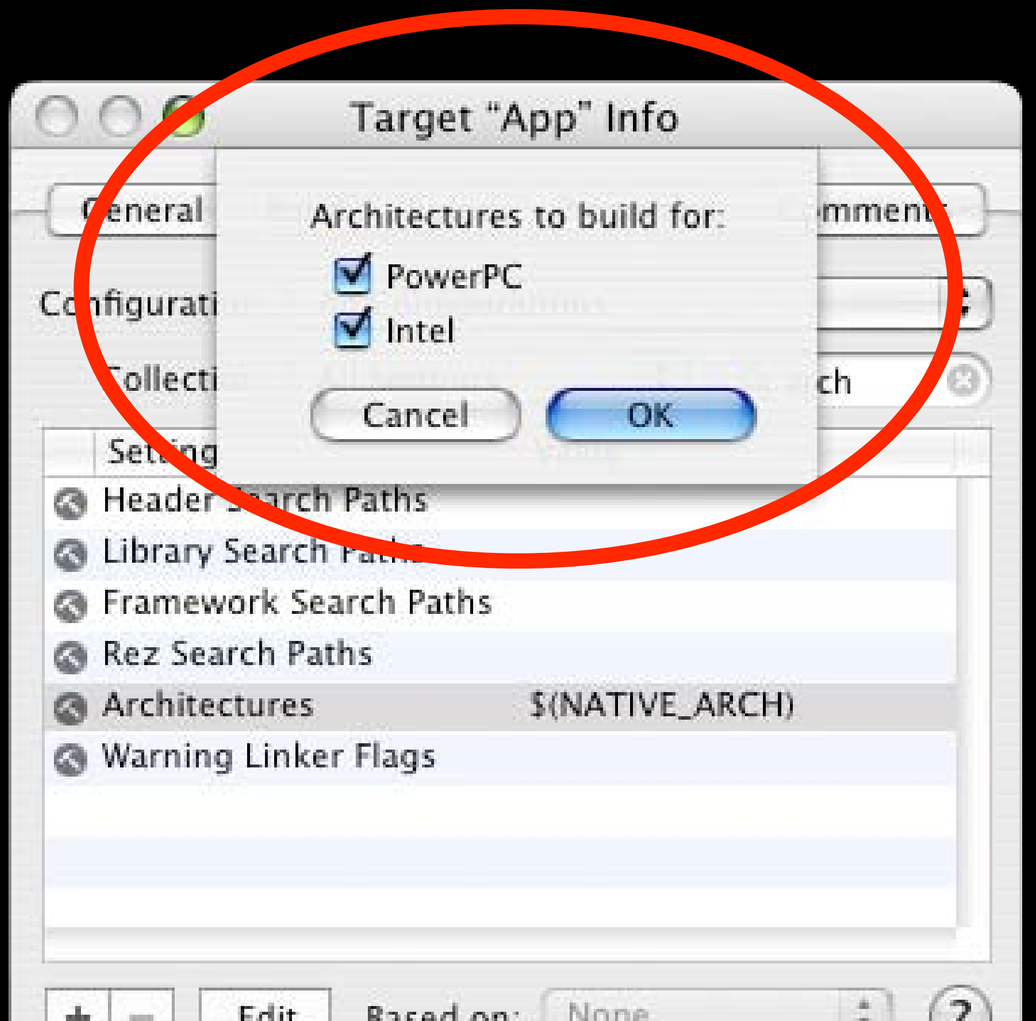


Universal Binary



Xcode Makes Universal Binaries Easy

- Pick your architectures, click Build, Xcode does the rest



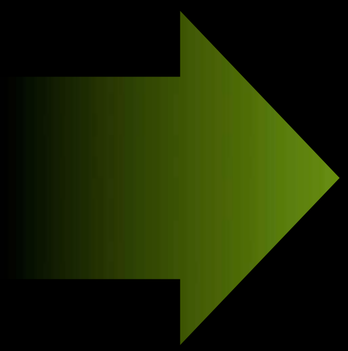
gcc 4.0-The Universal Compiler

- Latest version of 4.0 from the FSF
- Many tuning options to support Intel architecture
- Autovectorization for SSE2
- Intrinics for the SSE2

Improved #pragma Support

```
#pragma optimization_level 3
#pragma optimization_level reset
```

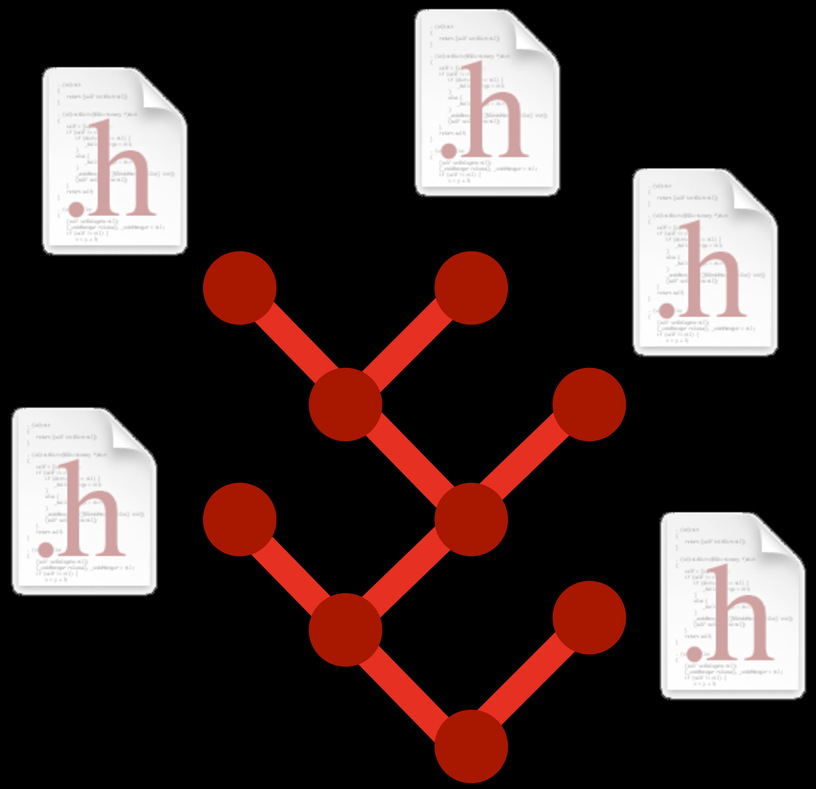
```
#pragma reverse_bitfields on
struct
  {
  unsigned int b1: 1;
  unsigned int b2: 2;
  unsigned int b3: 4;
  unsigned int b4: 8;
  unsigned int b5: 16;
  } bits;
```



```
struct
  {
  unsigned int b5: 16;
  unsigned int b4: 8;
  unsigned int b3: 4;
  unsigned int b2: 2;
  unsigned int b1: 1;
  } bits;
```

Shared Precompiled Headers

- Speeds up your development time
- Fine grain control bringing header file state together



Notes for PowerPC Programmers

- Intel is little-endian, instead of big-endian
- Intel supports SSE2, instead of Altivec
- Integer divide-by-zero raises a signal, instead of returning zero
- Read the Universal Binary Programming Guidelines for solutions

For the Heat Seekers Out There...

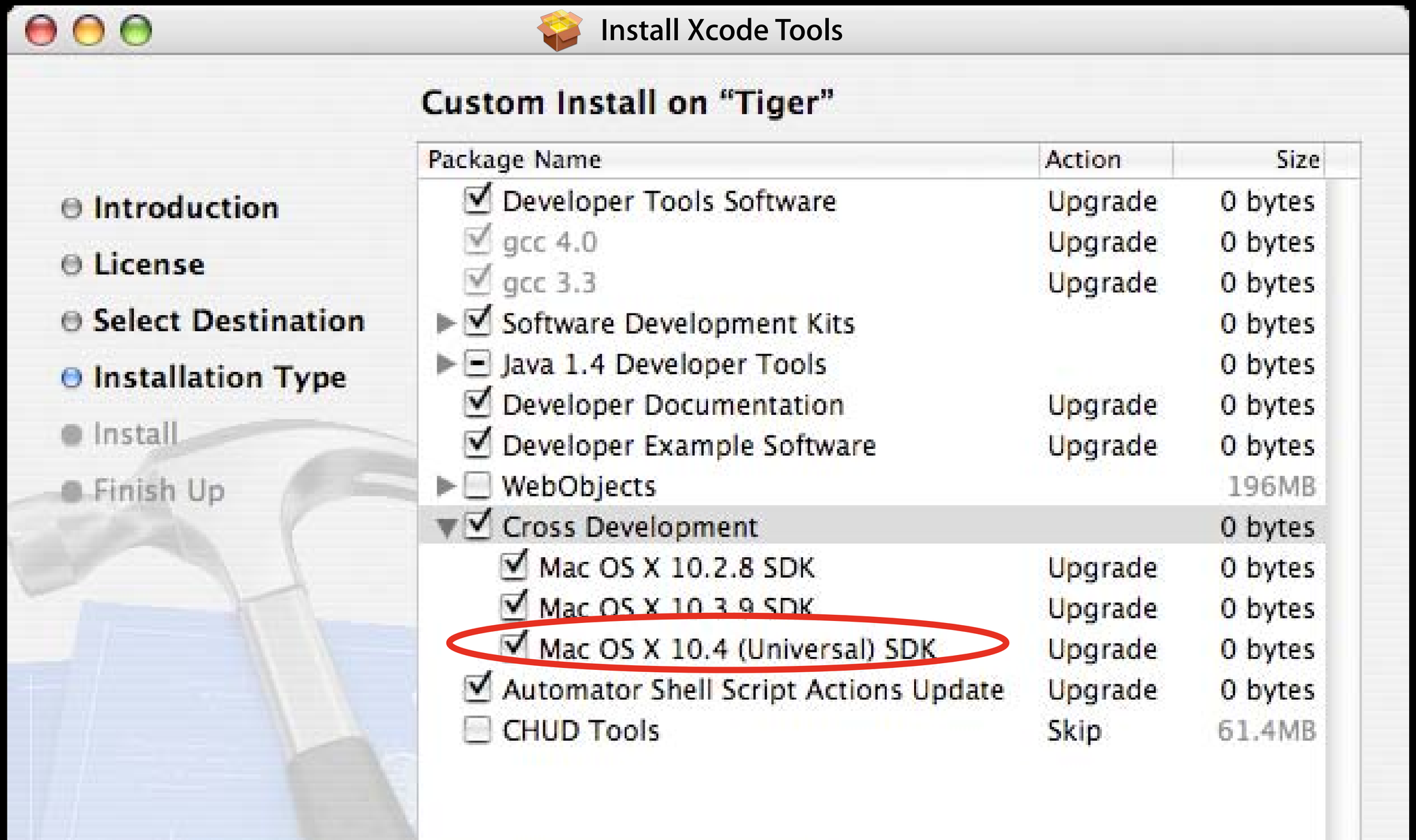
Get every ounce of performance out of the hardware

- Accelerate
  - Vector math, graphics, DSP routines tuned and optimized for each CPU
  - Use the accelerate framework and you always have the best possible optimizations for the machine your application is running on
- Autovectorization
  - GCC4.0 will autovectorize loops
- Write SSE2 Intrinsics

SDKs are Key to Universal Binaries

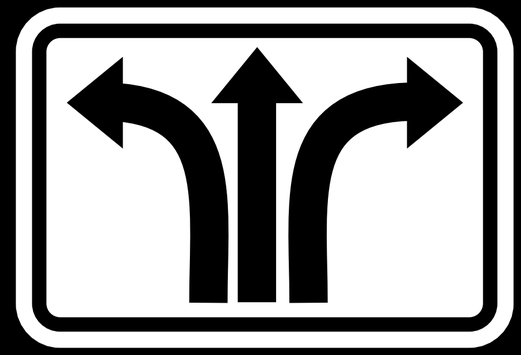
- Software Development Kits
  - Compile with headers and link with frameworks for Jaguar and above
  - Take advantage of the newest Xcode features
- Live on the newest Operating System—always with the latest tools
  - Provides release to release binary compatiblity to previous OS releases
  - Your app will work because the SDK is frozen in time

SDKs


Install Xcode Tools
Custom Install on "Tiger"
Introduction
License
Select Destination
Installation Type
Install
Finish Up
Package Name
Action
Size
Developer Tools Software
Upgrade
0 bytes
gcc 4.0
Upgrade
0 bytes
gcc 3.3
Upgrade
0 bytes
Software Development Kits
0 bytes
Java 1.4 Developer Tools
0 bytes
Developer Documentation
Upgrade
0 bytes
Developer Example Software
Upgrade
0 bytes
WebObjects
196MB
Cross Development
0 bytes
Mac OS X 10.2.8 SDK
Upgrade
0 bytes
Mac OS X 10.3.9 SDK
Upgrade
0 bytes
Mac OS X 10.4 (Universal) SDK
Upgrade
0 bytes
Automator Shell Script Actions Update
Upgrade
0 bytes
CHUD Tools
Skip
61.4MB

Simple to Use Build Configurations

- Replace Build Styles
- More intuitive UI
- WYSIWYG Target Editing
- Each configuration builds to a separate folder
- You can even store settings in files



Chris Espinosa

Manager of Developer Tools Productivity

http://developer.apple.com/wwdc2005/

Xcode's Enhanced Project File Format

- It's Readable
- It's Diffable
- It's Mergeable

project.pbxproj (Example1.xcodeproj vs. Example.xcodeproj)

project.pbxproj – /tmp/Example1.xcodeproj

```
// !$*UTF8*$!
{
    archiveVersion = 1;
    classes = {
    };
    objectVersion = 42;
    objects = {

/* Begin PBXBuildFile section */
        8D11072D0486CEB800E47090 /* main.m in Sources */ = {isa = PBXBuildFile; fileRef =
29B97316FDCFA39411CA2CEA /* main.m */; settings = {ATTRIBUTES = (); }; };
/* End PBXBuildFile section */

/* Begin PBXFileReference section */
        29B97316FDCFA39411CA2CEA /* main.m */ = {isa = PBXFileReference; fileEncoding = 4; lastKnownFileType
= sourcecode.c.objc; path = main.m; sourceTree = "<group>"; };
        32CA4F630368D1EE00C91783 /* Example_Prefix.pch */ = {isa = PBXFileReference; fileEncoding = 4;
lastKnownFileType = sourcecode.c.h; path = Example_Prefix.pch; sourceTree = "<group>"; };
        8D1107320486CEB800E47090 /* Example.app */ = {isa = PBXFileReference; explicitFileType =
wrapper.application; includeInIndex = 0; path = Example.app; sourceTree = BUILT_PRODUCTS_DIR; };
/* End PBXFileReference section */

/* Begin PBXGroup section */
        29B97314FDCFA39411CA2CEA /* Example */ = {
            isa = PBXGroup;
            children = (
                080E96DDFE201D6D7F000001 /* Classes */,
                29B97315FDCFA39411CA2CEA /* Other Sources */,
                29B97317FDCFA39411CA2CEA /* Resources */,
                29B97323FDCFA39411CA2CEA /* Frameworks */,
                19C28FACFE9D520D11CA2CBB /* Products */,
            );
            name = Example;
            sourceTree = "<group>";
        };
```

project.pbxproj – /tmp/Example2.xcodeproj

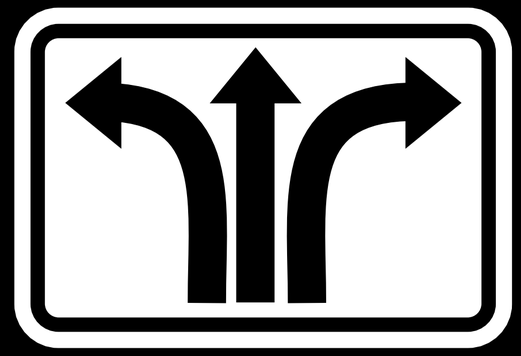
```
// !$*UTF8*$!
{
    archiveVersion = 1;
    classes = {
    };
    objectVersion = 42;
    objects = {

/* Begin PBXBuildFile section */
        8D11072D0486CEB800E47090 /* main.m in Sources */ = {isa = PBXBuildFile; fileRef =
29B97316FDCFA39411CA2CEA /* main.m */; settings = {ATTRIBUTES = (); }; };
        B384153E084E79EF009AE77D /* MyClass.m in Sources */ = {isa = PBXBuildFile; fileRef =
B384153D084E79EF009AE77D /* MyClass.m */; };
/* End PBXBuildFile section */

/* Begin PBXFileReference section */
        29B97316FDCFA39411CA2CEA /* main.m */ = {isa = PBXFileReference; fileEncoding = 4; lastKnownFileType
= sourcecode.c.objc; path = main.m; sourceTree = "<group>"; };
        32CA4F630368D1EE00C91783 /* Example_Prefix.pch */ = {isa = PBXFileReference; fileEncoding = 4;
lastKnownFileType = sourcecode.c.h; path = Example_Prefix.pch; sourceTree = "<group>"; };
        8D1107320486CEB800E47090 /* Example.app */ = {isa = PBXFileReference; explicitFileType =
wrapper.application; includeInIndex = 0; path = Example.app; sourceTree = BUILT_PRODUCTS_DIR; };
        B384153C084E79EF009AE77D /* MyClass.h */ = {isa = PBXFileReference; fileEncoding = 4;
lastKnownFileType = sourcecode.c.h; path = MyClass.h; sourceTree = "<group>"; };
        B384153D084E79EF009AE77D /* MyClass.m */ = {isa = PBXFileReference; fileEncoding = 4;
lastKnownFileType = sourcecode.c.objc; path = MyClass.m; sourceTree = "<group>"; };
/* End PBXFileReference section */

/* Begin PBXGroup section */
        29B97314FDCFA39411CA2CEA /* Example */ = {
            isa = PBXGroup;
            children = (
                B384153C084E79EF009AE77D /* MyClass.h */,
                B384153D084E79EF009AE77D /* MyClass.m */,
                080E96DDFE201D6D7F000001 /* Classes */,
```

New File Format has a New File Extension

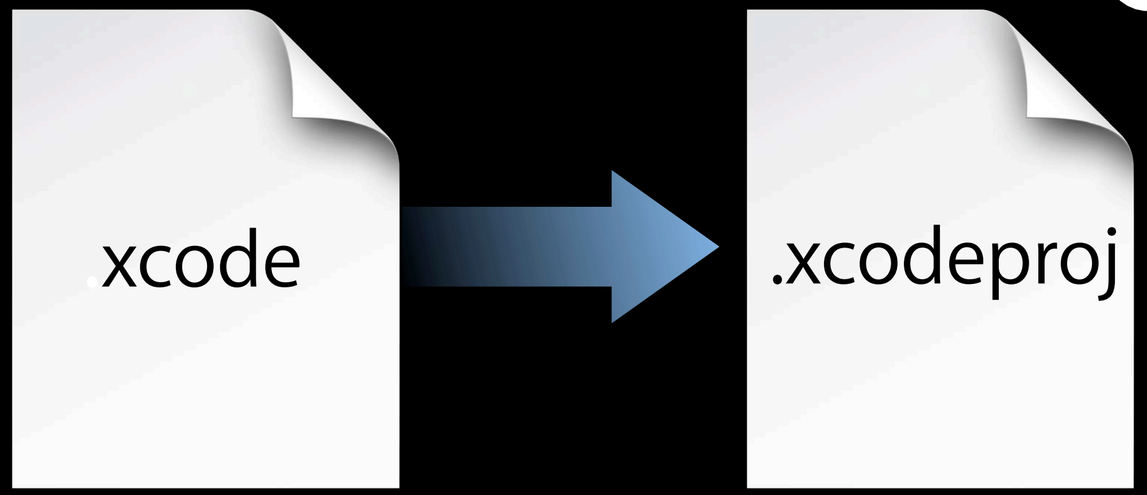
.xcodeproj

- Automatic one step migration from Xcode 2.0 to Xcode 2.1
- Supports Merge/Diff and Configuration format

Merge



Configurations



Unit Testing: Built into Xcode 2.1

- Enables faster debugging, more robust product development
  - Lowers costs by reducing development time
  - Increases probability of achieving schedules
- Industry standard capabilities allow for easy 3rd-party adaptability
  - Supports C, C++, Objective-C, Objective-C++ and Java
  - Easily plug in your own test tools
  - “Test-first” / “Test while you develop” approach
  - Increases confidence that modifications do not break invariants

Unit Testing

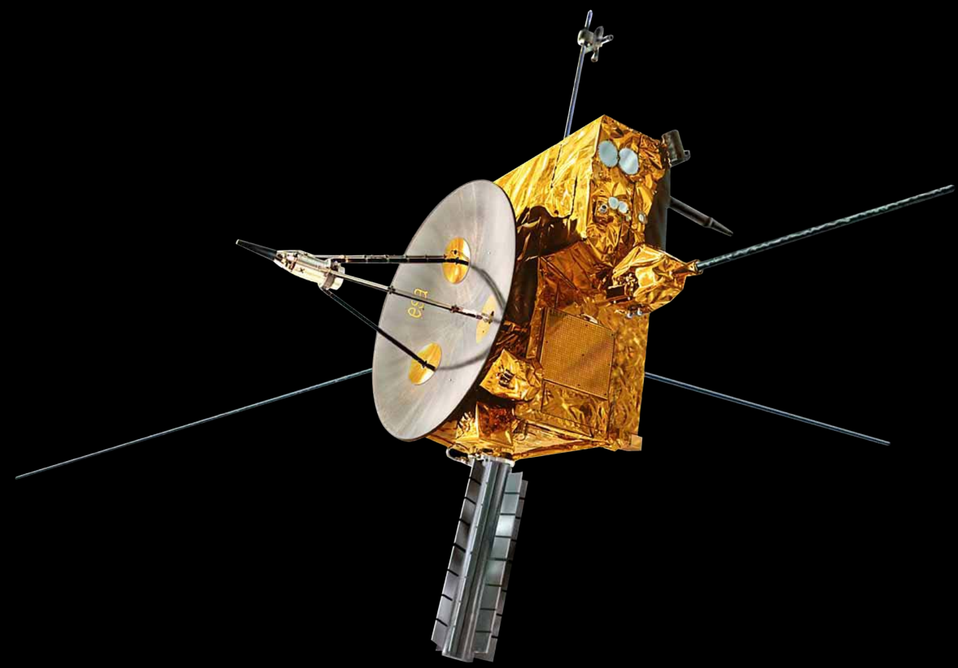
Unit Testing: Tight Integration with Xcode

- Evolve the test case as you make the change
- Testing frameworks and tools included
- Target/file templates for tests
- Tests run as part of the build process
- Errors are reported via build results just like compile and link errors

Unit
Testing

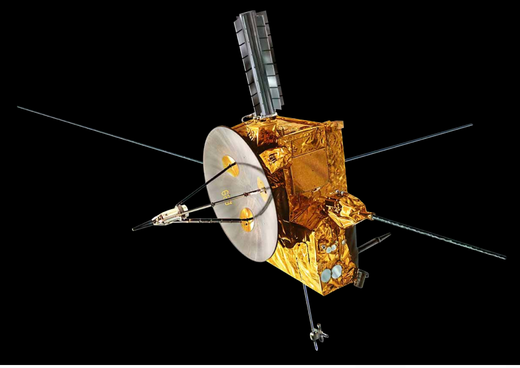
Debugging Enhancements

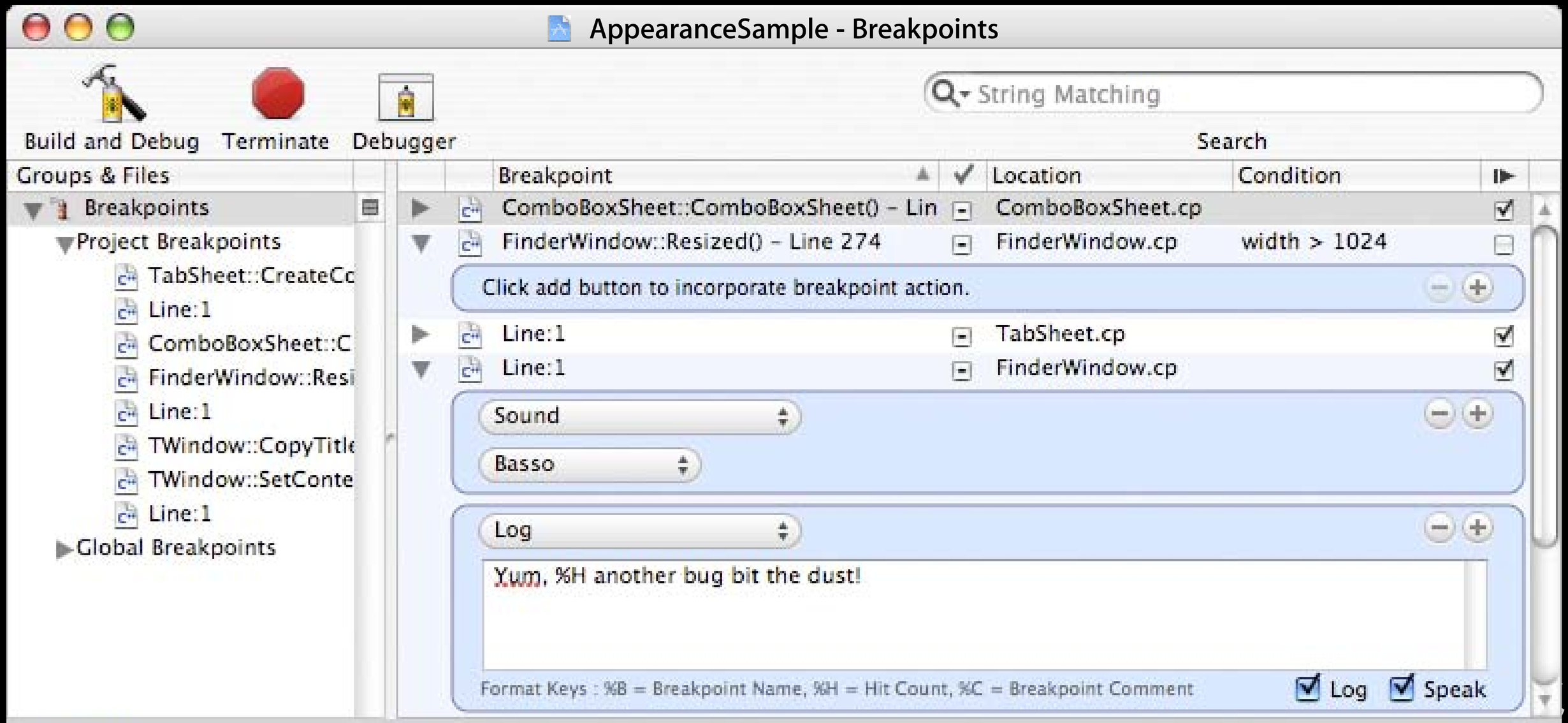
- Remote Debugging across Architectures
- Conditional breakpoints
- Breakpoint actions
  - on the fly behavior modification of your application for debugging and observing
    - AppleScript Command
    - Shell Command
    - Sound
    - Debugger Command
- Watchpoints



Debugging Enhancements

Inspired by Automator UI





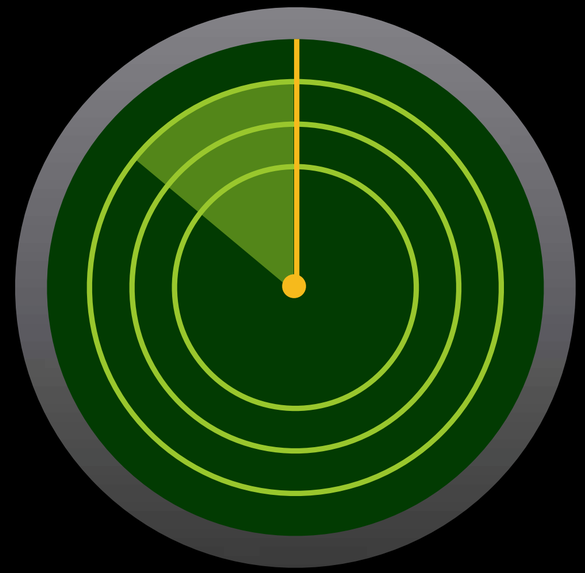
Actions and Visualization Demo

Chris Espinosa

http://developer.apple.com/wwdc2005/

Summary of Actions Visualizaton Feature

- Events are triggered to perform actions including Debugger State, Sound, Shell scripts, AppleScripts and Visualization
- Visualization feature expose program behavior allows you to understand large scale behavior of programs
- The answer is 42



CHUD 4.2 Developer Preview Download

- Supports Intel-based Macs
  - Time profiles
  - Disassembly
  - Intel-specific optimization tips
- New System Trace configuration
  - Visualize OS faults, system calls, thread tenures, and more
- Better support for grid/cluster setups
- MONster integration into Shark
- Java/Native code supported

Java

- Java 1.4.2 on the system
- Java 5.0 preview for Intel-based Macs available for download soon
  - Autoboxing
  - Generics
  - Both C1 and C2 Hotspot-based compilers
- Xcode Java Enhancements
  - Breakpoint actions
  - Code Visualization

WebObjects 5.3

Tools Now in Xcode 2.1

- Development license with every copy
- New Emphasis on Mac OS X
- EOF Modeling support now in Xcode Design Tools

Xcode Is the Home for Languages on Mac OS X

One Environment—Many Languages/Many Tools

- Java
- C/C++/Objective-C/Objective-C++
- AppleScript

Coming Soon…

Fortran from Intel

ICF Coming to Mac OS X Later This Year

Kevin Smith

Director, Intel Compiler Lab

http://developer.apple.com/wwdc2005/

Apple has the Tools
You need to create the
Greatest Applications
in the Universe

Apple has the Tools
You need to create the
Greatest Universal
Applications

Matthew Formica

Tools Evangelist, Apple Developer Relations

http://developer.apple.com/wwdc2005/

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- If you’re not yet using Xcode

The time to move to Xcode is now!

Xcode Engineering and Developer Relations

We are here to help

- At WWDC
  - Labs, sessions, and more labs
  - Test your code on a Developer Transition System with Xcode 2.1
  - Get your questions answered

Related Labs

Xcode Support Lab	Lab Tuesday 2:00PM
Xcode Support Lab	Lab Wednesday 9:00AM
Xcode Support Lab	Lab Thursday 9:00AM

Related Sessions

What's New in Xcode 2.1	Session 401 Tuesday 9:00AM
Adopting Xcode	Session 402 Tuesday 10:30AM
WebObjects Overview	Session 604 Tuesday 10:30AM

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WWDC2005

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